

# Washington State Fuel Cell Education and Demonstration Program

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**2004 DOE Hydrogen, Fuel Cells &  
Infrastructure Technologies  
Program Review Poster Session  
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*This presentation does not contain any proprietary or confidential information*

**Objective:** Create a tool and process to educate K-12 students about hydrogen and fuel cells.

## **Achievements:**

- Developed fuel cell curriculum and car kits.
- Held hands-on workshops for 200 teachers.
- Educate 18,000 Washington students by 9/30/04.
- Measure impact through pre- and post- quiz.
- Installed PEM fuel cell at Central Washington University.
- Offered additional fuel cell educational resources.
- Held four press conferences to increase public awareness.

# Washington Fuel Cell Education and Demonstration Program Budget

- Total program budget: \$225,000
- \$100,000 FY03 DOE funding
- 61% in-kind funding provided by OSPI, CWU, DoD, CHP Consortium, Washington science teachers, Sargent-Welch, Heliocentris, ReliOn and NWETC



# **DOE 3.8.4.1 Education Barriers**

- A. Lack of awareness**
- B. Lack of demonstration projects**
- C. Institutional barriers**
- D. Regional differences**

# Approach

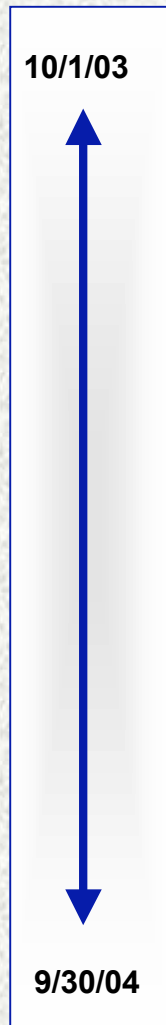
- Enlisted Superintendent of Public Instruction, Washington Science Teachers Association and science education champions to help with program.
- Negotiated contract for fuel cell car kits.
- Developed hydrogen/fuel cell curriculum tied to state standards.
- Curriculum includes eight hands-on experiments and other multi-media resources for 8<sup>th</sup> – 12<sup>th</sup> grade science classes.
- Held hands-on workshops for 200 teachers.
- CWU students designed PEM fuel cell installation and led tours of the demonstration project.
- Held press conferences to increase awareness.

# Safety

- Safety issues included in fuel cell curriculum.
- Safety stressed in teacher workshops.
- Safety a priority in the CWU fuel cell installation.
- Safety addressed in student-led tours of the demonstration project.



# Project Timeline



- DOE grant awarded 10/1/03.
- Enlisted OSPI, WSTA and science education champions for 10/3/03 kick-off.
- Negotiated contract for fuel cell car kits by 10/20/03.
- Developed hydrogen/fuel cell curriculum tied to state standards by 11/15/04.
- Held hands-on workshops for 200 teachers by 2/26/04.
- CWU students designed H2 PEM fuel cell installation; completed 3/10/04.
- Student-led tours of fuel cell demonstration project through 9/30/04. *(CWU will continue these tours on their own.)*
- Document number of students reached by 9/30/04.
- Project officially ends 9/30/04.

# Accomplishments

- Developed fuel cell curriculum and car kits.
- Held hands on workshops for 200 teachers.
- Will educate 18,000 Washington students by 9/30/04.
- Measured impact through pre- and post-education quiz.
- Installed PEM fuel cell at Central Washington University.
- Offered additional fuel cell educational resources.
- Held four press conferences to increase public awareness.



# Fuel Cell Curriculum & Car Kits were well received

“Students were fighting over who got to work with the cars first.”

“I loved seeing students’ eyes light up as they thought about what this energy source could mean.”

“The kids loved the kit. There was a very high level of focus.”



“Students want to sign the kit out on the weekend.”

# Teacher Workshops were very successful

- 3-hours long
- Hands-on
- FREE
- Clock hours or PD credits
- Reimbursement for substitutes

*“I liked the lessons and activities.”*

**“Excellent Workshop.”**

**“I’m excited about teaching about hydrogen cars.”**

## Washington Fuel Cell Education and Demonstration Program

# Interactions and Collaborations

- Washington Dept. of Communication Trade & Economic Development;
- Bonneville Power Administration;
- Pacific Northwest National Laboratory;
- National Hydrogen Association;
- American Hydrogen Association;
- Washington Office of Superintendent of Public Instruction;
- Central Washington University;
- Department of Defense, US Army CERL; and
- Combined Heat Power Consortium, Washington science teachers, Sargent-Welch, Heliocentris, ReliOn, Chelan PUD, Clark PUD, Snohomish PUD, ESD's, the City of Ellensburg and the Northwest Energy Technology Collaborative.



# Future Work

- Presentation at 15th Annual U.S. Hydrogen Conference; others encouraged to become fuel cell education champions.
- Additional fuel cell curriculum and car kits available through June 15, 2005. *(Order kits from Sargent-Welch for \$234, including shipping. Contact Ray Kufeldt at 1.800.727.4368, ext. 510; email [Ray\\_Kufeldt@vwr.com](mailto:Ray_Kufeldt@vwr.com); Refer to Catalog No. WLZ2149M under Quote# VBQ-1368985.)*
- Student-led tours of the CWU fuel cell will continue.
- Fuel cell posters will be displayed throughout Washington.
- BPA's fuel cell education web site will remain available.